Date of Accident:	February 3, 2014
Location:	Bellevue, Tennessee
NTSB File No.:	ERA14FA112
Aircraft:	Gulfstream Commander 690C
Registration No.:	N840V
Serial No.:	11727
Operator:	per the FAA registry:
	Mid Kansas Agri Co.
	Pawnee Rock, KS 67567-9510
Written by:	Dan Boggs Air Safety Investigation Manager Rev. 1 by Les Doud - Air Safety Investigator
Date:	February 11, 2014 Revision 1 - February 15, 2016

NOTE: All changes are indicated by a black vertical line along the left margin.

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ACCIDENT SYNOPSIS

According to the NTSB, the aircraft was destroyed when it impacted the ground near Bellevue, Tennessee while on approach to the John C. Tune Airport (JWN). The aircraft was coming from Great Bend Municipal Airport in Great Bend Kansas. The aircraft was cleared for a GPS approach to runway 2 at JWN. The pilot subsequently performed a missed approach and was cleared for a second GPS approach to runway 2. During the second attempt, the airplane was on the final approach course when it veered to the left and began a descent. The airplane had turned to a heading of about 210 degrees before radar contact was lost. A weather observation taken at JWN at 1655 included an overcast ceiling at 800 feet, and visibility of 5 statute miles.

Aircraft Damage: Destroyed

Injuries: Four on board, four fatal

SUMMARY AND ANALYSIS OF FINDINGS

Both propellers remained attached to their respective gearboxes which had separated from their respective engines. Both propellers had blades fractured off the hub during impact. Both spinners were missing. The blade damage on both propellers included chordwise scoring and leading edge gouges consistent with rotation at the time of impact.

Left propeller:

The left propeller had all three blades fracture off during impact. The cylinder was damaged and could not be removed from the hub due to the spring being compressed. The left propeller blade exhibited more bending and twisting relative to the right propeller blades.

Right propeller:

The right propeller had one blade fractured off during impact. Portions of two blade tips were fractured. The right propeller blades displayed more significant chordwise scoring, edge gouges, and tears in addition to the tip damage compared to the left propeller. The cylinder and feathering spring assembly were fractured off the hub and loosely hanging by the pitch change/beta rod in the engine.

CONCLUSIONS

Both propellers had signs of chordwise scoring, leading edge gouges, bending and twisting. This is indicative of rotation prior to impact. The severity of damage to the right propeller blades is indicative of power ON at time of impact. A definitive blade angle could not be established due to damage during impact.

There were no discrepancies noted that would preclude normal operation. All damage was consistent with high impact forces.

PROPELLER TEARDOWN REPORT

Date of Investigation: February 5, 2014

Location:	AMF air salvage, S	pringfield TN
Propeller Model:	HC-B3TN-5NL with	LT10876ANS(B)-2Q blades
Representatives:	Dan Boggs Jay Eller Luke Schiada	Hartzell Propeller Inc. Honeywell NTSB

General Comments:

This type propeller is a 3-bladed single acting, hydraulically operated, constant speed model with feathering and reversing capability. Oil pressure from the propeller governor is used to move the blades to the low pitch (blade angle) direction. Blade mounted counterweights and a feathering spring actuate the blades towards the high pitch/feather direction in the absence of governor oil pressure. The propeller incorporates a start lock mechanism that holds the blades at a low blade angle during engine start. The blades are of aluminum construction. The hub and blade clamps are steel. Propeller rotation is counter-clockwise as viewed from the rear.

Installation Data:	Refer to Hartzell Installation Data Sheet No. 38
	(Data reference the 42-inch station)

Reverse Pitch:	-18.0 <u>+</u> 0.5 degrees
Start Lock:	-6.0 <u>+</u> 0.2 degrees
Feather:	80.0 <u>+</u> 0.5 degrees
Diameter:	106.5"

Service History:

	<u>S/N</u> <u>D</u>	ate of manufacture	<u>TTSN</u>	<u>TSO</u>
Left Hub Blades	BUA22884 J53052 J53059 J53061	11/24/1999 10/23/2000 10/23/2000 10/23/2000	Unknown Unknown Unknown Unknown	265.4 265.4 265.4 265.4
Right Hub Blades	BUA29846 K99206 K99209 K99211	04/20/2005 03/31/2010 03/31/2010 03/31/2010	Unknown Unknown Unknown Unknown	265.4 265.4 265.4 265.4

Position:		LEFT
Hub Serial Number:		BUA22884
Blade Model:		LT10876ANSB-2Q
S/N	J # 1:	J53052
S/N	J # 2 ·	153059

S/N # 3: J53061

Blade Orientation:

L1-L2-L3 clockwise as viewed from the rear of the propeller. All three blades were fractured off the hub. Unable to determine blade orientation.

"As Received" Condition:

See pictures on page 5.

The propeller was still attached to the gearbox; however the gearbox had separated from the engine. All three blades were fractured off. The spinner was missing. The cylinder housing was bent due to impact. The clamps and counterweights had fractured bolts and half of a clamp was missing. The propeller was too dangerous to remove the cylinder and feathering spring assembly off the hub. The propeller was left on the gearbox for the teardown. The mounting bolts could not be accessed due to impact damage.

Spinner Dome:

The spinner dome was missing.

Spinner Bulkhead:

The spinner bulkhead was bent, fractured, and mangled due to impact.

Propeller Cycling:

The propeller cycling was not possible due to impact damage.

Engine/Propeller Mounting:

The propeller was still attached to the gearbox. All eight bolts were intact and safety wired. The propeller could not be removed due to damage.

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Photo #1, left propeller as received.



Photo #2, left propeller as received.

Blade/Clamp Rotation:

All three blades were fractured off the hub during impact.

Pitch Stops:

Reverse Pitch Stop:	The reverse pitch stop was not observed due to impact damage.
Feather Stop:	The feather stop was damaged due to impact.
Start Lock:	The start locks were fractured and in pieces.

Piston:

Only small fractured pieces remained on the link arm and cylinder.

Link Arms:

Only one link arm could be found and it had compression bending.

Cylinder:

The cylinder was bent. It could not be removed for further observation due to damage and a compressed spring inside the assembly.

Feathering Spring Assembly:

The feathering spring assembly was not observed due to a damaged cylinder and inability to relieve spring tension.

Pitch Change Rod:

The pitch change rod was not observed due to a damaged cylinder and inability to relieve spring tension.

Clamps and Counterweights:

The clamps and counterweights could not be removed due to damage. Half of one clamp was missing with the counterweight.

Clamp serial numbers:

1: EM8510	
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- 2: EM5259
- 3: EM5282

Hub Unit:

The mounting flange was not observed due to damage.

The cylinder attachment was not observed due to impact damage.

Blades:

See pictures on page 8.

Blade # 1 paint, camber side paint, flat side bend twist	 scratches, gouges and rotational scoring. scratches, gouges. bent forward midblade, bent aft at the tip. none.
trail edge damage butt impression	 gouges midblade to tip. none. hub ring at the 3 o'clock from leading edge.
Blade # 2 paint, camber side paint, flat side bend twist lead edge damage trail edge damage butt impression	 scratches, gouges. scratches, gouges. bent forward at midblade. none. none. none. hub ring at the 3 o'clock from leading edge.
Blade # 3 paint, camber side paint, flat side bend twist lead edge damage trail edge damage butt impression	 scratches, gouges. scratches, gouges. bent aft midblade to tip. twist aft at tip. scratches. gouges midblade to tip. hub ring at the 12 o'clock from leading edge.

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Photo #3, left propeller blades.



Photo #4, left propeller blades.

Position: RIGHT

Hub Serial Number: BUA29846

Blade Model: LT10876ANSB-2Q

S/N	# R1: K99209
S/N	# R2: K99206
S/N	# R3: K99211

Blade Orientation:

R1-R2-R3 clockwise as viewed from the rear of the propeller. The hub serial number was between the $\#_{R2}$ and $\#_{R3}$ and $\#_{R3}$ blades.

"As Received" Condition:

See pictures on page 10.

The propeller was attached to the gearbox; however the gearbox had separated from the engine. One propeller blade was fractured off the hub. The cylinder and feathering spring assembly was fractured off the hub and loosely hanging on the propeller. The propeller was not removed from the gearbox due to damage of the spinner bulkhead blocking access to the mounting bolts.

Spinner Dome:

The spinner dome was missing.

Spinner Bulkhead:

The spinner bulkhead was bent and fractured in several areas due to impact.

Propeller Cycling:

Propeller cycling was not possible due to impact damage.

Engine/Propeller Mounting:

The propeller was not removed from the gearbox due to a damaged spinner bulkhead blocking access to the mounting bolts. However, all eight bolts were intact and safety wired.

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Photo #5, right propeller as received.



Photo #6, right propeller as received.

Blade/Clamp Rotation:

One blade was fractured off the hub; the other blades had rotated in the clamps.

Pitch Stops:

Reverse Pitch Stop:	The reverse pitch stop was not observed due to impact damage.
Feather Stop:	The feather stop was intact and bent from impact damage.
Start Lock:	The start locks were missing.

Piston:

Only small fragmented pieces of the piston remained on the link arms.

Link Arms:

All three link arms were intact but had compression bending.

Cylinder:

The cylinder was cracked on two sides. The pitch change rod was stuck inside due to the rod being bent.

Feathering Spring Assembly:

The feathering spring assembly was stuck inside the cylinder due to damage. The spring was stretched and bent. The entire spring could not be observed due to being stuck inside the cylinder.

Pitch Change Rod:

The pitch change rod was bent and could not be removed from the cylinder.

Clamps and Counterweights:

All three clamps were intact, however a couple mounting bolts were fractured. The R1 and R2 counterweights were missing.

Clamp serial numbers:

1: EM5305

- 2: EM5316
- 3: EM5303

Hub Unit:

The mounting flange was not observed due to damage of the spinner bulkhead and inability to remove propeller from the gearbox.

The cylinder attachment was stripped due to impact damage.

Blades:

See pictures on page 13.

Blade # 1 paint, camber side paint, flat side bend twist lead edge damage trail edge damage butt impression	 scratches, rotational scoring. scratches. none. none. nicks and gouges at midblade. tear approximately 20" from the base. hub mark at the 12 o'clock position.
Blade # 2 paint, camber side paint, flat side bend twist lead edge damage trail edge damage butt impression	 scratched, rotational scoring. scratched, rotational scoring. bent aft at tip. Tip torn off. none. gouges and bends. Q-tip un-bent/flattened, portion of tip approximately 1"x2" along leading edge fractured. tear approximately 24" from base. hub mark at the 3 o'clock position.
Blade # 3 paint, camber side paint, flat side bend twist lead edge damage trail edge damage butt impression	 scratches. scratches. Tip bent. none. nicks and gouges at tip. Q-tip partially un-bent, portion of tip approximately 1"x1" along leading edge fractured. dents. butt ring was torn off.

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Photo #7, right propeller blades.

